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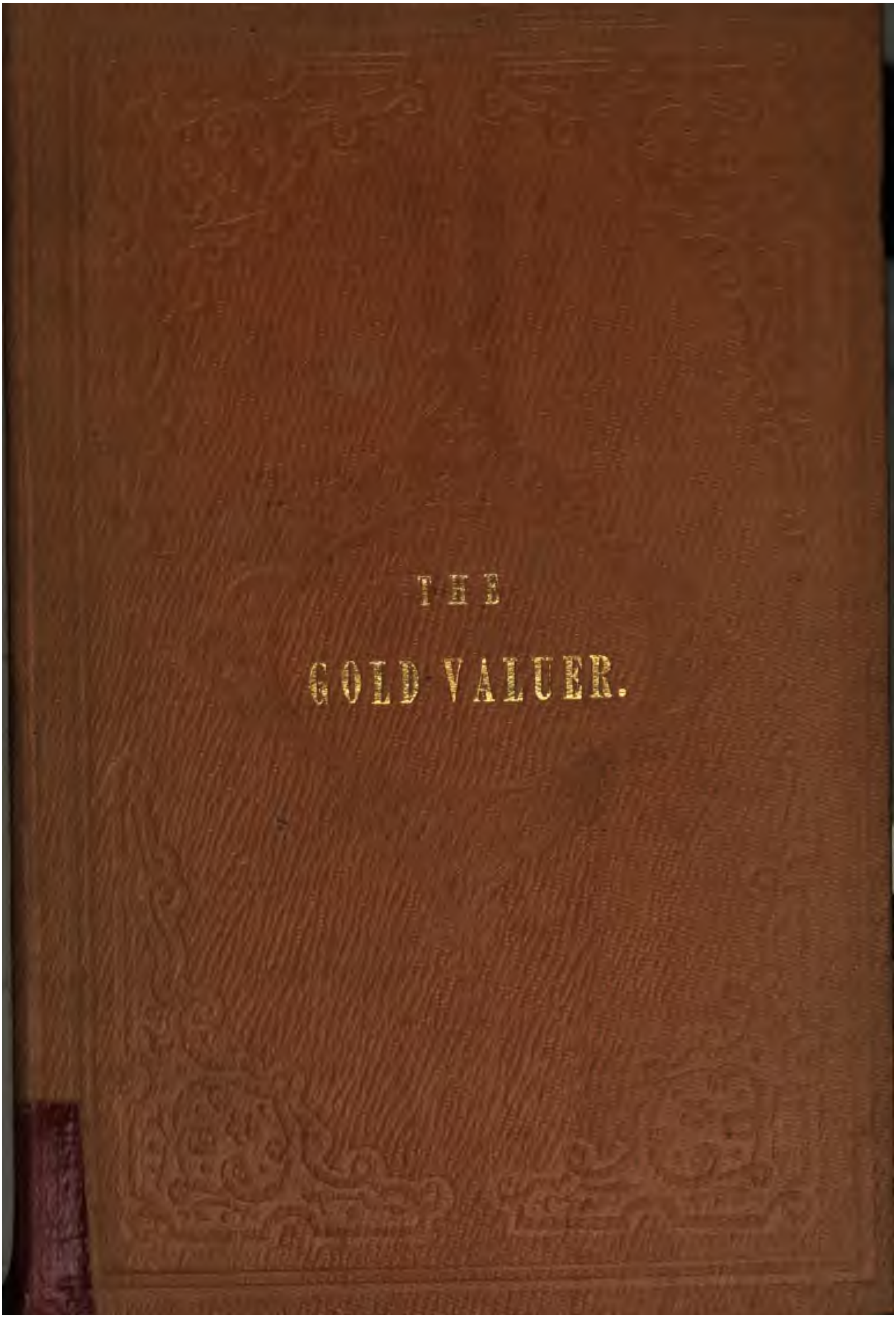

THE
GOLD VALUER.

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BEING

A TABLE FOR ASCERTAINING THE VALUE OF GOLD, AS NATURALLY PRODUCED OR ARTIFICIALLY AMALGAMATED:

WITH A FAMILIAR EXPLANATION OF

THE ART OF ASSAYING GOLD AND SILVER;

OR, THE MODE OF ASCERTAINING THE PROPORTION OF PURE
GOLD IN ANY GIVEN QUANTITY OF METAL.

BY

JAMES H. WATHERSTON,
GOLDSMITH, OF LONDON.
Author of "Tables for the Use of the Pix Jury."

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INTRODUCTION.

SOME years ago, the writer framed and published the accompanying Table for the use of his brethren in the Goldsmiths' trade; to whom the subject of alloying gold, and its value when alloyed, might then have been presumed to yield an almost exclusive interest.

The enormous discoveries of gold, however, that have since been made in California and Australia, have invested the peculiarities of that noble metal with a universal regard, and would seem to render a *Gold Valuer* an indispensable companion both to the miner and the merchant; as it can no longer be doubted that gold, which has hitherto been accepted as the measure of value of all other commodities, is now destined itself to become an article of commerce: and, it may be, affected in value, like all other things, by the supply and demand.

To the miners especially, both in California and Australia, such calculations as these cannot fail to be of signal advantage; inasmuch as the first holders of gold in those regions may be supposed to be persons who, for the most part, are totally unacquainted with the principles which govern the value of gold, and are rendered thereby liable to be taken advantage of by those who are better informed.

If anything were wanting to establish this fact, it might be found in the announcement in the *Times* of Friday the 6th February, viz.:

"That some considerable quantities of the gold from the Port Philip mines had found their way to Sydney, and had been readily bought on account of their great purity. One thousand ounces, purchased by one party at £3. 4*s*. 6*d*. per ounce, were found 7½ per cent. better than standard." Thus it would appear, that gold better than 23½ carats fine = £4. 3*s*. 8½*d*., was sold at the price of 18¼ carats fine, or at a loss of 19*s*. 2*d*. per ounce.

Had this table been in the hands of the owner of this gold, it is difficult to conceive how such a sacrifice could have been made, informed as he would have been of the fact that a very slight variation in the quality of gold (better or worse) makes a great difference in the aggregate on a large amount; and it is because the writer believes that such losses are of daily occurrence, that he hastens to furnish his countrymen in the colonies with that kind of information which shall enable the most inexperienced of them to judge of the value of their property.

Gold is divided into 24 parts, or carats, 1,000: each carat into 4 grs., and these again into fourths and eighths of a carat grain.

It is consequently the practice of assayers to report gold by carats, grains, and quarters of grains; and at the British Mint, gold is reported as low as one-eighth of a carat grain.

Twenty-two carat gold (*i. e.* 22 parts of pure gold and 2 parts of alloy melted together) being standard, assayers are in the habit of reporting gold as better or worse than standard. Thus, if I send a piece of gold to be assayed, and the report is returned to me as "Worse 4 carats 2¾ grs."—it means, that it is so much worse than standard; for example :—

	Car.	grs.	
	22	0	= standard.
Deduct worseness	4	2¾	

Ergo, 17 1¼ is the quality of my gold, and the value of it I ascertain from the tables, thus:—

Car.	grs.		£	s.	d.
17	1	is worth per oz.	3	1	0·733
0	0¼		0	0	2·655
17	1¼	=	£3	1	3·388

If, on the other hand, the report I receive from the assayer is "Better 1 carat 2¼ grains," I conclude that my gold is 23 carats 2¼ grains fine, and its value I ascertain as follows:—

Car.	grs.		£	s.	d.
23	2	is worth per oz.	4	3	2·215
0	0¼	” ”			2·655
23	2¼		4	3	4·870

Whatever may be the vulgar opinion concerning gold, it is in the character of a "*Measure of Value and an Equivalent*" that its chief utility consists;—and it is only in proportion as these two great offices which it serves may be expanded and secured, that the vast addition which is now being made to the gold of the world will really be a blessing to mankind.

Should the quantity obtained from the mines reach such a limited point as may suffice for a gold coinage all over the globe (of a uniform, and therefore of a fixed value), an inestimable advantage will be secured; while, on the other hand, should the quantity be far in excess of what is required for this purpose, and the market be supplied with gold as it has heretofore been supplied with some of the inferior metals,—so that gold, of which our money is made, shall be perpetually varying in value even in reference to itself,—under such circumstances as these, it is difficult to say how far the commerce of the world may be deranged, or that which is now received as a boon will be esteemed a calamity.

Henrietta Street, Covent Garden,
February 1852.

TABLE

SHEWING THE RELATIVE QUANTITIES OF

FINE GOLD AND ALLOY IN ONE OUNCE OF METAL, of any Quality that can be found (whether in its Natural State, or Artificially Compounded), and the Sterling Value thereof.

FINE GOLD.			ALLOY.		1 oz. of Carat Gold.	STERLING VALUE.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
1	0	0	0	0	24	4	4	11.454
0	19	19	0	5	$23\frac{3}{4}$	4	4	0.835
0	19	14	0	10	$23\frac{2}{4}$	4	3	2.215
0	19	9	0	15	$23\frac{1}{4}$	4	2	3.596
0	19	4	0	20	23	4	1	4.977
0	18	23	1	1	$22\frac{3}{4}$	4	0	6.357
0	18	18	1	6	$22\frac{2}{4}$	3	19	7.738
0	18	13	1	11	$22\frac{1}{4}$	3	18	9.119
0	18	8	1	16	22	3	17	10.500
0	18	3	1	21	$21\frac{3}{4}$	3	16	11.880
0	17	22	2	2	$21\frac{2}{4}$	3	16	1.261
0	17	17	2	7	$21\frac{1}{4}$	3	15	2.642
0	17	12	2	12	21	3	14	4.022

Fine Gold.			Alloy.		1 oz. of Carat Gold.	Sterling Value.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
0	17	7	2	17	20¾	3	13	5.403
0	17	2	2	22	20²⁄₄	3	12	6.784
0	16	21	3	3	20¼	3	11	8.164
0	16	16	3	8	20	3	10	9.545
0	16	11	3	13	19¾	3	9	10.926
0	16	6	3	18	19²⁄₄	3	9	0.306
0	16	1	3	23	19¼	3	8	1.687
0	15	20	4	4	19	3	7	3.068
0	15	15	4	9	18¾	3	6	4.448
0	15	10	4	14	18²⁄₄	3	5	5.829
0	15	5	4	19	18¼	3	4	7.210
0	15	0	5	0	18	3	3	8.591
0	14	19	5	5	17¾	3	2	9.971
0	14	14	5	10	17²⁄₄	3	1	11.352
0	14	9	5	15	17¼	3	1	0.733
0	14	4	5	20	17	3	0	2.113
0	13	23	6	1	16¾	2	19	3.494
0	13	18	6	6	16²⁄₄	2	18	4.875
0	13	13	6	11	16¼	2	17	6.255
0	13	8	6	16	16	2	16	7.636
0	13	3	6	21	15¾	2	15	9.017
0	12	22	7	2	15²⁄₄	2	14	10.397
0	12	17	7	7	15¼	2	13	11.778
0	12	12	7	12	15	2	13	1.159
0	12	7	7	17	14¾	2	12	2.539
0	12	2	7	22	14²⁄₄	2	11	3.920
0	11	21	8	3	14¼	2	10	5.301
0	11	16	8	8	14	2	9	6.682
0	11	11	8	13	13¾	2	8	8.062
0	11	6	8	18	13²⁄₄	2	7	9.443
0	11	1	8	23	13¼	2	6	10.824

Fine Gold.			Alloy.		1 oz. of Carat Gold.	Sterling Value.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
0	10	20	9	4	13	2	6	0.204
0	10	15	9	9	12¾	2	5	1.585
0	10	10	9	14	12²⁄₄	2	4	2.966
0	10	5	9	19	12¼	2	3	4.346
0	10	0	10	0	12	2	2	5.727
0	9	19	10	5	11¾	2	1	7.108
0	9	14	10	10	11²⁄₄	2	0	8.488
0	9	9	10	15	11¼	1	19	9.869
0	9	4	10	20	11	1	18	11.250
0	8	23	11	1	10¾	1	18	0.630
0	8	18	11	6	10²⁄₄	1	17	2.011
0	8	13	11	11	10¼	1	16	3.392
0	8	8	11	16	10	1	15	4.773
0	8	3	11	21	9¾	1	14	6.153
0	7	22	12	2	9²⁄₄	1	13	7.534
0	7	17	12	7	9¼	1	12	8.915
0	7	12	12	12	9	1	11	10.295
0	7	7	12	17	8¾	1	10	11.676
0	7	2	12	22	8²⁄₄	1	10	1.057
0	6	21	13	3	8¼	1	9	2.437
0	6	16	13	8	8	1	8	3.818
0	6	11	13	13	7¾	1	7	5.199
0	6	6	13	18	7²⁄₄	1	6	6.579
0	6	1	13	23	7¼	1	5	7.960
0	5	20	14	4	7	1	4	9.341
0	5	15	14	9	6¾	1	3	10.721
0	5	10	14	14	6²⁄₄	1	3	0.102
0	5	5	14	19	6¼	1	2	1.483
0	5	0	15	0	6	1	1	2.864
0	4	19	15	5	5¾	1	0	4.244
0	4	14	15	10	5²⁄₄	0	19	5.625

Fine Gold.			Alloy.		1 oz. of Carat Gold.	Sterling Value.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
0	4	9	15	15	$5\frac{1}{4}$	0	18	7.006
0	4	4	15	20	5	0	17	8.386
0	3	23	16	1	$4\frac{3}{4}$	0	16	9.767
0	3	18	16	6	$4\frac{2}{4}$	0	15	11.148
0	3	13	16	11	$4\frac{1}{4}$	0	15	0.528
0	3	8	16	16	4	0	14	1.909
0	3	3	16	21	$3\frac{3}{4}$	0	13	3.290
0	2	22	17	2	$3\frac{2}{4}$	0	12	4.670
0	2	17	17	7	$3\frac{1}{4}$	0	11	6.051
0	2	12	17	12	3	0	10	7.432
0	2	7	17	17	$2\frac{3}{4}$	0	9	8.812
0	2	2	17	22	$2\frac{2}{4}$	0	8	10.193
0	1	21	18	3	$2\frac{1}{4}$	0	7	11.574
0	1	16	18	8	2	0	7	0.955
0	1	11	18	13	$1\frac{3}{4}$	0	6	2.335
0	1	6	18	18	$1\frac{2}{4}$	0	5	3.716
0	1	1	18	23	$1\frac{1}{4}$	0	4	5.097
0	0	20	19	4	1	0	3	6.477
0	0	15	19	9	$0\frac{3}{4}$	0	2	7.858
0	0	10	19	14	$0\frac{2}{4}$	0	1	9.239
0	0	5	19	19	$0\frac{1}{4}$	0	0	10.619
0	0	$3\frac{3}{4}$	19	$20\frac{1}{4}$	$\frac{3}{4}$ of carat grain.	0	0	7.965
0	0	$2\frac{1}{2}$	19	$21\frac{1}{2}$	$\frac{2}{4}$ ”	0	0	5.310
0	0	$1\frac{1}{4}$	19	$22\frac{3}{4}$	$\frac{1}{4}$ ”	0	0	2.655
0	0	$1\frac{3}{8}$	19	$23\frac{5}{8}$	$\frac{1}{8}$ ”	0	0	1.327

OF ASSAYING GENERALLY.

When we speak of assaying the precious metals, it may be safely affirmed that we refer to a subject which in point of magnitude and general utility yields to no other that can be named: whether we contemplate it in its bearing upon the interests of individuals or of nations, we are brought to the same conclusion, viz., that it is a subject of vast, of universal importance.

Gold and silver being the most precious of metals, and forming, as they do, "the measure of value" all over the globe, it is obvious how great is the necessity that some unerring principles should be established, whereby to detect the frauds which mankind unhappily practise upon each other.

Such a check and protection, both to individuals and to nations, does the office of the assayer afford, by suggesting to the individual members of a community the impolicy of practising any deceit in the mixture of their metals, when such deceit can be easily detected; while on a more extended scale, and where the fatal effects of deceit and fraud would be co-extensive with the mercantile and social transactions of the world, it presents an effectual barrier against one nation imposing upon another in the all-important article of its bullion.

In the absence of any such check, it is obvious that all confidence would be at an end: nothing could be bought or sold, and universal suspicion would ensue. The respect which we now feel for the coin of the realm would be changed for distrust, while the confidence we are able to repose in the bullion of foreign countries would speedily wither and decay; and thus mankind would lose the immense advantage of a metallic currency.

The importance which the Legislature of our own highly-favoured country attaches to this subject, may be inferred from the safeguards by which it has thought fit to surround the manufacture of our gold and silver coinage. To the Government of the country is, of course, entrusted the duty of mixing the metals, and subsequently converting them into coin: the precise weights and fineness having been previously determined by acts of Parliament. The whole is done under the superintendence of the Master of the Mint, who is held responsible for its correct performance. But lest through mistake, or design on the part of the officers concerned, any error should creep in, by which the coin of the realm should be depreciated, the Legislature has wisely enacted, that at certain times a jury of twelve independent goldsmiths, well skilled in the art and mystery of assaying, shall be empannelled, under the superintendence of the Goldsmiths' Company, to sit in judgment upon the coin of the realm, and by weighing and assaying it themselves, act as a check upon the paid officers of the Crown. This jury is called the "*pix jury,*" from the duties it has to perform; and which are briefly these: When ever a batch of gold or silver coin is made at the Mint, the Legislature has enacted that a certain proportion shall be selected therefrom, and be carefully preserved as a sample of the weight and fineness of the whole.

These coins, so picked out (the number of which varies according to the number that has been coined, but always bearing an exact proportion to the same),* are carefully wrapped up in paper parcels, sealed with the seal of the Wardens, Masters, and Comptrollers of the Mint, and endorsed as being a given number of coins indifferently selected from a certain quantity that was coined on a certain day, and deposited in a box, called the "Pix Box,"† under the lock and key of the above-named sworn officers of the Crown.

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* Of gold, one coin out of every journey (a weight of 15 lbs. troy = £700 17*s.* 6*d.* sterling). Of silver, one coin out of every journey (a weight of 60 lbs. troy = £198 sterling).

† *Pixus*, Latin for a little chest.

The duty, then, of the jury is to weigh and assay these coins, and it is plain that if they prove to be correct in weight and fineness, so must the mass have been from which they were taken; no matter whether the aggregate amount were one of hundreds, of thousands, or of millions.

The whole proceeding was formerly conducted with great solemnity: the opening of the box, unsealing of the parcels, and the examination of the coins, taking place in the presence of the Privy Council, presided over by the Lord Chancellor; who delivered a charge to the jury, pointing out to them the importance of the duty they are about to undertake, and calling upon them, as men well skilled in the art and mystery of assaying, and under the obligation of an oath, to exercise this their art to the best of their ability, for the benefit of the Queen's Majesty, and the weal of the nation. The examination of the coins is now made at Goldsmith's Hall; the jury having previously received their charge from the Lord Chancellor, in the presence of the Privy Council, at the Court of Exchequer.

Seeing, then, that to the goldsmiths of London has been assigned so honourable a position, it may be presumed they have made it their study—from a just sense of its importance, and their own individual responsibility — to maintain this ancient institution in all its integrity, by bringing to the inquiry the precise amount of knowledge requisite for its satisfactory elucidation. If, however, to his younger brethren of the craft, the writer may be permitted to address a few remarks, he would strongly advise them to study the subject, and to acquire such a knowledge* of its principles as shall enable

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* The Royal College of Chemistry supplies the means for attaining this knowledge.

OF GOLD ASSAYING, AND THE WEIGHTS NECESSARY FOR THAT PURPOSE.

In this operation the weights are different from those used for a silver assay. Gold, when separated from alloy, is weighed in carats, grains, and quarters of a grain; four grains to the carat, and twenty-four carats to the pound troy. The assay weights are sixteen in number, all of them made with the nicest art to secure precision: 12 grains troy representing 24 carats, or one grain to every two carats; the thirty-second part of a grain representing one quarter of a grain of gold.

GOLD CARAT AND ASSAY WEIGHTS.

Gold.				Assay.
Car.	grs.	qrs.	(Troy)	Grs.
24	0	0	represented by a weight weighing . . .	12
22	0	0	”	11
18	0	0	”	9
12	0	0	”	6
6	0	0	”	3
3	0	0	”	$1\frac{1}{2}$
2	0	0	”	1
1	0	0	”	$0\frac{1}{2}$ a grain.
0	3	0	”	$\frac{3}{8}$ do.
0	2	0	”	$\frac{2}{8}$ do.
0	1	0	”	$\frac{1}{8}$ do.
0	0	3	”	$\frac{3}{32}$ do.
0	0	2	”	$\frac{2}{32}$ do.
0	0	1	”	$\frac{1}{32}$ do.

For Water (or pure) Silver, which is used in all gold assays, a weight representing 36, and another for 48 carats are required.

That of 36 cts. being represented by 18 grs.
” 48 cts. ” ” 24 ”

These two assay weights, together with the fourteen in the above table, complete sixteen, the number mentioned.

Presuming, then, that the weights and scales are before the assayer, the first thing he does is to place the weight representing 24 carats in one pan of the scales, and in the other pan the exact same weight of the gold under trial; and supposing, for the sake of illustration, that the operator suspected from the colour of the gold that its quality was of about 18 carats, he should add to it the finest silver, weighing 18 grains troy only, but in the assay weighed by the weight *representing* 36 carats. There would then be exactly double the quantity of silver to that of fine gold, for as 12 actual grains represented 24 carats, 18 grains will represent 36 carats. The gold and silver (weighing together 30 grains, but representing 60 carats) are then to be wrapped up in lead, shaped in the bullet mould as in the case of silver assaying, and placed in a cupel. This is put in the furnace for the space of about 25 minutes, but experience alone can determine *when* it should be taken out.

The result of this operation will be, that the fire will have caused the lead which wrapped up the gold and silver, together with whatever copper or other base metal there might have been in the gold, to descend into the cupel, leaving a small button of pure gold and silver, which must then be taken out of the cupel, and be hammered with a bright hammer on an anvil, and passed through a polished flatting-mill until it is about two or three inches in length, when it is called a "Cornet."

The next thing is to drop the metal into diluted nitric acid, and place it upon a sand bath heated by a fire underneath. This will have the effect of separating the silver from the gold, by dissolving or holding the former in solution, while the gold retains its solidity. This being effected, the assayer takes out the gold, and with a blow-pipe makes it red hot, a process termed annealing, which will turn it into a rich yellow colour: it is then in reality pure "fine gold." The next thing is to decide the precise quality it was of before the assay, and this he will easily ascertain by placing in one pan of the scales the weight representing 22 carats (or standard), and in the other pan the piece of now pure gold under trial; and supposing, for the sake of illustration, he finds that the gold is not so heavy as the 22 carat weight, by the weight representing 4 carats, it is obvious that the gold previous to the assay was of the quality of 18 carats, or, in other words, 4 carats worse than standard; or, on the other hand, should it be found heavier than the 22 carat weight, by the weight representing one carat, it follows that it was so much better than standard.

QUESTION ARISING OUT OF THE PRECEDING CHAPTER.

Q. Why is it necessary to unite fine silver with gold, in making a gold assay?

A. Because in the operation in the cupel it is only the baser metals which are extracted, leaving whatever quantity of fine gold, or fine silver there was in the mass each pure but still united. These the assayer separates by dissolving the silver in nitric acid, which will not dissolve the gold; and therefore when the gold is in excess, it protects the silver from the action of the nitric acid, which is obviated by adding sufficient silver to weaken the protective power of the gold: this requires some judgment; for if too much silver is added, the gold falls into a black powder, and is then difficult to collect. When the right quantity of silver is used, and is extracted, the gold assumes a porous appearance, with a rich brown colour.

OF PARTING ASSAYS.

IN this operation the weights which are used for making a silver assay must be employed, as the inquiry about to be instituted is respecting the quantity of pure gold and silver there may be in 12 ounces (or a pound troy) of the metal under consideration.

Thus the assayer should place in one pan of his scales the weight representing a pound troy, and in the other the exact same weight of the metal about to be tested. This being done, he should wrap up the latter in lead, and commit it to the furnace, to remove the baser metals, as previously described, there to remain about 25 minutes, more or less, according to his judgment. He should then weigh it accurately, and, for the sake of illustration, we will suppose it now weighs only 11 ounces (*i. e.*, the weight representing 11 ounces); it is obvious there is one ounce deficient, and that is copper or baser metal, which the fire has extracted.

The next thing is to examine the button of *now* pure gold and silver remaining, with a view to ascertain what proportion of pure silver it will be necessary to add to it for the purpose of parting the two metals in the acid, and this requires great practice and judgment to determine. No precise rule can be laid down on this point, which shall be uniformly followed, as it all depends upon the quantity of silver there may appear to be in it already. It may, however, with safety be affirmed, that when the metal has been refined, if it have a very white appearance, it will be sufficient to add to it its own weight of silver *only*; whereas, if it be of a pale gold colour, then one and a half its own weight; and if of a higher colour, twice its own weight, and so on; the higher and richer the colour of the gold, the more silver it will require, up to three times its own weight, but never more than this. It is highly necessary, however, to proportion it with correctness as near as possible; as too much silver makes a broken assay, and if not enough, the acid will not act upon it, to effect a separation. When the proper complement of silver is added, it must be rolled up in sheet lead, committed to the furnace, and subsequently to the nitric acid, as previously described in the article on gold assaying.

The next part of the process is to weigh it accurately, and subtract the present weight from what it amounted to after first refining, which we have assumed to be 11 ounces; and supposing, for the sake of illustration, that it *now* exactly tallies with the weight representing 10 ounces, it is obvious there is 1 ounce deficient in this last operation, which is silver; *so* much silver having been extracted by the nitric acid over and above the quantity that may have been added to it. The result would then stand thus, viz.—

	Oz.
Weight of lump before the fire representing	12
„ after do.	11
Deficient	1 oz. being

copper or other base metal extracted.

	Oz.
Weight of lump before the acid representing	11
„ after do.	10

Deficient 1 oz. being silver extracted.

	Oz.
Or, fine gold	10
„ silver	1
„ copper, or base metal	1

12 oz., or 1 lb. troy.

OF SILVER ASSAYING, AND THE WEIGHTS NECESSARY FOR THAT PURPOSE.

IT may be necessary to premise, that to make an assay, implies a desire to know how much fine gold or silver there may be in any given quantity under consideration, no matter whether the metal be in a manufactured state or not; as in no case would it answer to operate on the mass. It is obvious, therefore, that the only way in which this question can be decided is by making the experiment upon a small scale; that is, by reducing the inquiry from one of hundreds or thousands of ounces, to one of grains and parts of a grain. Thus, for example, should any one desire to ascertain how much fine silver there is in an ingot of large dimensions, say of 250 ounces weight, the plan of proceeding will be, to determine, in the first place, whether the ingot is properly melted; and if so, then to take a piece off the bottom, weighing 12 grs. troy exactly, which to the mind of the assayer may represent 12 ounces, or one pound troy, and upon this piece, weighing 12 grs., to make the experiment; and it is plain that whatever amount of fine silver there is found to be in this small quantity, precisely the same amount must there be, in proportion, in any weight that can be named; that is, presuming the whole to be, as we have said before, properly melted.

Precisely the same plan will be pursued should the inquiry be regarding wrought plate, such as epergnes, dishes, forks, spoons,

&c.; only, in this case, scrapings must be taken from such parts as are perfectly free from solder, and care must be taken to scrape a portion from every part that has been connected by solder, and this can only be done by an experienced workman, who shall perfectly understand *how* the work has been brought together. Presuming this to be done, and the scrapings are considerable, more than one assay must be made, probably four or five, according to the quantity of scrapings; and it now remains to explain *how* the assay is made. First of all, then, the assayer must be furnished with a set of weights (12 in number), as described in the accompanying table, all of them being made with mathematical precision, and bearing the same comparative relation to each other, as follows:—

TABLE OF SILVER ASSAY WEIGHTS.

For the sake of convenience, the weights are so arranged that the one representing a pound troy shall not exceed 12 grains troy.

Oz.	dwt.	grs.		Grains.
12	0	0	represented by	12
11	0	0	”	11
6	0	0	”	6
3	0	0	”	3
2	0	0	”	2
1	0	0	”	1
0	10	0	”	½ a grain.
0	5	0	”	¼ of do.
0	3	0	”	$\frac{6}{10}$ of ¼ do.
0	2	0	”	$\frac{4}{10}$ of ¼ do.
0	1	0	”	$\frac{2}{10}$ of ¼ do.
0	0	12	”	$\frac{1}{10}$ of ¼ do.

And below this (viz., half a dwt. better or worse than standard) no notice is taken in silver assays. In making a set of weights, therefore, the first one required is a weight representing ½ dwt., weighing one-tenth part of a quarter of a grain troy, and this, too, with the utmost mathematical precision.

The weights, then, being before the assayer, the next thing required is a pair of finely-adjusted scales, which will turn with the weight of the hundredth part of a grain, enclosed in a glass-shade, to prevent the air or breath of the assayer from operating upon them. He should also have by him a piece of silver *known* to be standard; or, in other words, containing 11 oz. 2 dwts. of pure silver, and 18 dwts. of copper, in every twelve ounces, or pound troy. He then puts in one pan of his scales the weight representing the pound troy, and in the other an equal weight of the standard silver (called a check); after which, he takes out the weight, and supplies its place with the silver, the quality of which is about to be tested. The scales with the two quantities of metal exactly balancing, he takes the check piece and wraps it up in a piece of thinly flatted pure lead, and, having moulded it into shape, in a bullet mould, it is placed in a vessel called a cupel, made of burnt bone-ash, and in form resembling a cube about $\frac{7}{8}$ths of an inch deep, and tapering towards the bottom, the top part having a hole sunk in it the exact size of the interior of the bullet mould.

The same thing precisely is done with the silver under trial; and then both cupels are put into the furnace, and kept there for the space of about 25 minutes. The result of this operation is that the lead in which the silver was wrapped up becomes absorbed by the bone-ash of which the cupel is made, together with whatever quantity of copper or other base metal there might have been in the silver; and the silver comes out of the fire quite pure. The next thing is to compare the metals one with the other; that is, to place the check piece in one pan of the scales, and the trial piece in the other; and supposing that the latter is found to be lighter than the former, it is obvious that it is worse than standard; whereas, if it be found heavier, it is better than standard; and it remains to be seen how much. This is easily ascertained by the application of the weights already mentioned: thus, if the trial piece be found to be heavier than the check, to the extent of the little weight representing one pennyweight, then it is one pennyweight better than standard; whereas, if it be so much lighter, it is one pennyweight worse than standard; or in any other proportion, as the case may be.

QUESTION ARISING OUT OF THE PRECEDING CHAPTER.

Q. Why is it necessary to unite lead with silver, in making a silver assay?

A. Because of the affinity which lead has to the copper, or any base metal that may be in the silver, and which it is the object of the assayer, aided by the fire, to remove. When in fusion, the lead has a property of combining with any baser metal than silver, and carrying it down with itself into the cupel, always taking, however, a small fraction of the silver with it. This is called the affinity of metals: hence it follows, that the coarser the silver under trial, the greater is the quantity of lead necessary to be added to it.

OF STANDARD GOLD.

It is obvious that there can be only one standard: the contrary implies a contradiction in terms. Two standards cannot go together without the danger of being exposed to continual conflict from the fluctuations of their relative values in the market, compared with that at which they are rated at the Mint; and, to prevent this evil, all the eminent writers on coin are agreed that only one metal can be the money or standard measure of property and commerce in any country.

In England, this standard is gold: it is the buyer of everything: it buys even silver; and, as an axiom in political economy, it should always be deemed that, while gold *is* the measure of value, it can never have a price: it is both a measure and an equivalent. It is, in fact, the "PRICE."

Standard gold, as by law established, is a composition in which there are 22 parts of fine gold, and 2 parts of alloy in every 24 parts; and its price of 77*s.* 10½*d.* per oz. was fixed in the reign of Charles II., when it was ordained that 44½ guineas should be cut out of a pound troy: 77*s.* 10½*d.* being the $\frac{1}{12}$th part of £46. 14*s.* 6*d.* This standard was formerly the only one allowed for wrought plate, and it was consequently unlawful for a goldsmith to make any vessel or ware of less fineness; but in the reign of George III. it was found to be expedient to permit goldsmiths to employ gold in their manufactures less in fineness than 22 carats, and an Act of Parliament was passed to allow, for this purpose, a lower quality, viz., one of 18 carats, or of a composition containing 18 parts of fine gold, and 6 parts of alloy.

The object of the Legislature in both cases was evidently the same, viz., to afford a protection to the public against being imposed upon in a matter in which deceit and fraud were so difficult to detect; and in which the consequences of fraud would be so serious, owing to the great value of the metal (that of 22 cts. being 77*s.* 10½*d.*, and that of 18 cts. 63*s.* 8½*d.* per oz.). And, on this account, the Legislature enacted, in the first place, that gold less in fineness than a defined quality should not be wrought into plate or jewellery; and in order to enforce this regulation, it conferred upon the Goldsmiths' Company power to survey, search, and make trial of whatever gold they found in the course of manufacture in the shops of the workmen, and if such gold were found to be worse than standard, to break up the same, levying fines upon the parties so offending. The Company, too, had authority delegated to them to administer to their freemen an oath, whereby they promised "that they would not work, or cause to be wrought, in their manufactures, gold or silver less in fineness than the standard appointed for wrought plate."

In order to afford the public a still greater guarantee that the quality of the gold they purchased was what it appeared to be, the Legislature empowered the Goldsmiths' Company to call upon the manufacturers to bring all the articles they made to their Hall, for the purpose of being assayed, and stamped with their Hall mark.

In process of time, however, it became

necessary to make exceptions to this latter rule. It was found that requiring everything to be Hall-marked cramped the talent of invention, and prevented the goldsmith making many articles which his taste led him to introduce, and which his foreign rivals were producing. Hence, it became necessary to exempt from Hall-marking such articles as, by reason of their smallness, form, or rich chasing, could not be assayed, or if assayed, could not receive the Company's marks.

These exemptions once made opened a door which could not be shut. Exemption from Hall-marking sanctioned by law, soon led to reduction in quality contrary to law. What the Goldsmiths' Company had not the power to *mark*, it could not be expected it should be responsible for; and hence arose a practice, which, up to the present time, has remained unchecked, of every kind and quality of gold being used in the manufacture of jewellery, *without such quality being specially denoted:* a practice which cannot now be stopped, and the evil consequences of which in many respects cannot be estimated.

Hence it is obvious that as respects nine-tenths of the jewellery which is manufactured in this country, no guarantee exists whereby the public may be assured of the quality of the gold of which it is made: all that they can depend upon is the character of the goldsmith. If he be a man of integrity, he will of course be trusted; but if not, the opportunities of practising deceit and fraud which are placed within his reach are great beyond conception.

OF STERLING SILVER; AS IT IS NOW, LEGAL TENDER FOR FIVE POUNDS; AND AS IT IS LAWFUL FOR WROUGHT PLATE.

GOLD being the principal measure of value and instrument of commerce; silver, as it circulates in coin, takes its value from, and becomes subservient to it.

Standard silver, therefore, is a thing which has no existence in Britain, seeing that it is bought and sold with gold, and is liable to fluctuations in value, like all other commodities.

A scarcity of gold, or a redundance of silver, will have the same effect on their relative values. Silver, here, will be lower in price, while on the Continent, where silver is the standard or measure of value, the premium on gold will advance.

The United States, after their independence, took silver (the Spanish dollar) for their standard of value; but coined gold pieces of 5 and 10 dollars, of the relative value of about 15 to 1: which relative value afterwards increasing to about 15½ to 1, the gold, as a consequence, disappeared. They have now reduced their gold coins from 916 fine to 900 fine, and 11 dwt. 6 grs. in weight to 10 dwt. 18 grs.; but this is no tampering with the coinage, or robbery on the public—silver, in America, being the "PRICE." The same effect occurs in France, but is adjusted by the agio on gold.

At a former period, when silver was the British measure of value, it was ordained that it should contain 11 oz. 2 dwt. of fine silver, and 18 dwt. of copper in every pound troy; and of the same quality is the silver coin now made: circulating, as it does, as a legal tender for five pounds *only*.

Of this quality the Legislature has also ordained that all silver plate shall be made; and, in order to enforce the practice, has invested the Ancient and Worshipful Company of Goldsmiths of London, with full powers of making search in silversmiths' shops, and ordering the silversmiths to bring their work to the Goldsmiths' Hall, for the purpose of having it assayed (the like powers being conferred on several other corporations in different parts of the kingdom); and if found correct, to have the Company's Hall mark stamped thereon, indicative of such correctness: as also of the manufacturer having paid the sum of 1*s*. 6*d*. per oz. for duty, which the Goldsmiths' Companies collect for the Government, levying a small charge to reimburse themselves for marking, and the expense of making the assay.

If it be asked what is the value of silver, in wrought plate, the answer is that it varies from 5*s.* to 5*s.* 2*d.* per oz.; but as it depends upon the market price of fine silver, *that* being known, the former may always be ascertained by the following method:—

Fine silver,	11 oz.	2 dwt.
Copper,	0	18 „
Make	12 oz.	of sterling silver.

This is the quality required by law for all silver plate of British manufacture.

Supposing, then, that fine silver is worth 5*s.* 6*d.* per oz., calculate the value of 11 oz. 2 dwt. of such silver, and divide the product by 12, and you have the value of one ounce of sterling silver. Thus, one ounce of fine silver being worth—

s.	*d.*		Oz.	dwt.	
5	6				
	11 oz. 2 dwt.				
60	6				
	6½				
61	0½	is the value of	11	2	of fine silver,
		and the copper not being reckoned	0	18	
61	0½	is the value of	12	0	of sterling silver, or 5*s.* 1*d.* per oz.

OF ALLOYS.

It is not generally known that gold and silver, in their fine and pure state, are both metals so soft that they cannot be wrought into useful articles. The difficulty, however, is removed by mixing with them a small portion of alloy; which in silver should consist of copper only, and in gold of a portion of silver and copper. Hence the necessity that a correct scale of alloys should be established, which shall enable the goldsmith to mix his metals in such a manner as may, by reason of the hardness or softness, and variety of colour attainable thereby, be best adapted for the articles into which they are intended to be wrought; and at the same time furnish the goldsmith with the means of readily ascertaining the precise value of the metal when alloyed.

Thus, for example, should the goldsmith desire to prepare his gold for the purposes of dental surgery, experience will have shewn him the necessity of a certain degree of softness being preserved in the metal which is to form the palate, while for the springs, a great degree of hardness is requisite; and for the one, he will mix his metal of the quality of 22 carats, and for the other, not finer than 16 carats, according to the preceding table; which exhibits not only the proportions of fine gold and alloy in every quality, but also the sterling value per ounce.

In like manner, should he desire gold to be manufactured into pens, he will seek to obtain the degree of elasticity which is indispensable for the production of a good pen; and this can only be procured by a larger proportion of silver in the alloy.

In a word, hardness, softness, beauty of colour, and adaptation for the reception of enamels, are the four points sought to be obtained by an expert goldsmith in preparing his gold; and in no other way than by a judicious mixture of alloy can they be produced.

Another, and perhaps the most important reason why the precious metal, gold, need be alloyed before it be manufactured into plate or jewellery, is the very high value of the metal itself, viz., 84*s.* 11½*d.* per oz.; for it is obvious, that were it even possible to convert it into useful articles in its fine or pure state, a great part of the public could not afford to purchase it. Consequently, a correct scale of alloy is indispensable for enabling the goldsmith to make his metal of any particular value his customers may desire; at least, for such articles as are not required by law to be made of 18 carat gold, and Hall-marked.

The mischief, however, attending the present system is this: many jewellers, with a want of candour much to be condemned, instead of acquainting the public with the foregoing facts respecting the absolute necessity of adding a portion of alloy to the precious metals, in order to render them useful, induce a belief that the contrary is the case, by affixing to most of the articles they sell the title of FINE GOLD! and thus, it is to be feared, they often succeed in obtaining an unfair equivalent for a metal of very low value, instead of the one they pretend it to be—*fine gold.*

This practice cannot be too strongly condemned; inflicting, as it does, a most serious injury both on the public, and the fair trading goldsmith. Upon the former a gross imposition is practised; while the latter is made to suffer a serious grievance, by having his good gold (frequently of 16 carats value) contrasted with inferior gold, often of the quality of no better than 10 or 11 carats: and that, too, by the very persons who do not hesitate to dignify with the title of "Fine Gold," spurious articles of jewellery, which they know to be composed of metal of much inferior value.

A new system of imposition which has been lately attempted, and it is feared not without considerable success, deserves to be noticed both by the trade and the public.

It has recently been found that gold of the quality of 11 carats, or less, if alloyed with zinc, instead of the proper quantity of silver, presents a colour very nearly equal to that of a metal at least 2½ or 3 carats higher; or of 8*s.* or 10*s.* an ounce more value. The consequence has been that a large quantity of jewellery has been made of gold alloyed in this manner, and the same has been purchased by some shopkeepers; very much to their own loss, as well as to that of the public; inasmuch as a galvanic action is produced, after a time, upon gold so alloyed, the effect of which is to split the metal into separate pieces, and render the article perfectly useless. Gold chains, pencil-cases, thimbles, and lockets, are the articles of which the public and the shopkeepers will do well to take heed; as these have, among other things, been lately so manufactured.

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THE

GOLD VALUER.

THE

GOLD VALUER;

BEING

A TABLE FOR ASCERTAINING THE VALUE OF
GOLD, AS NATURALLY PRODUCED OR
ARTIFICIALLY AMALGAMATED:

WITH A FAMILIAR EXPLANATION OF

THE ART OF ASSAYING GOLD AND SILVER;

OR, THE MODE OF ASCERTAINING THE PROPORTION OF PURE
GOLD IN ANY GIVEN QUANTITY OF METAL.

BY

JAMES H. WATHERSTON,
GOLDSMITH, OF LONDON.
Author of "Tables for the Use of the Pix Jury."

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INTRODUCTION.

Some years ago, the writer framed and published the accompanying Table for the use of his brethren in the Goldsmiths' trade; to whom the subject of alloying gold, and its value when alloyed, might then have been presumed to yield an almost exclusive interest.

The enormous discoveries of gold, however, that have since been made in California and Australia, have invested the peculiarities of that noble metal with a universal regard, and would seem to render a *Gold Valuer* an indispensable companion both to the miner and the merchant; as it can no longer be doubted that gold, which has hitherto been accepted as the measure of value of all other commodities, is now destined itself to become an article of commerce: and, it may be, affected in value, like all other things, by the supply and demand.

To the miners especially, both in California and Australia, such calculations as these cannot fail to be of signal advantage; inasmuch as the first holders of gold in those regions may be supposed to be persons who, for the most part, are totally unacquainted with the principles which govern the value of gold, and are rendered thereby liable to be taken advantage of by those who are better informed.

If anything were wanting to establish this fact, it might be found in the announcement in the *Times* of Friday the 6th February, viz.:

"That some considerable quantities of the gold from the Port Philip mines had found their way to Sydney, and had been readily bought on account of their great purity. One thousand ounces, purchased by one party at £3. 4*s*. 6*d*. per ounce, were found 7½ per cent. better than standard." Thus it would appear, that gold better than 23½ carats fine = £4. 3*s*. 8½*d*., was sold at the price of 18¼ carats fine, or at a loss of 19*s*. 2*d*. per ounce.

Had this table been in the hands of the owner of this gold, it is difficult to conceive how such a sacrifice could have been made, informed as he would have been of the fact that a very slight variation in the quality of gold (better or worse) makes a great difference in the aggregate on a large amount; and it is because the writer believes that such losses are of daily occurrence, that he hastens to furnish his countrymen in the colonies with that kind of information which shall enable the most inexperienced of them to judge of the value of their property.

Gold is divided into 24 parts, or carats, 1,000: each carat into 4 grs., and these again into fourths and eighths of a carat grain.

It is consequently the practice of assayers to report gold by carats, grains, and quarters of grains; and at the British Mint, gold is reported as low as one-eighth of a carat grain.

Twenty-two carat gold (*i. e.* 22 parts of pure gold and 2 parts of alloy melted together) being stqndard, assayers are in the habit of reporting gold as better or worse than standard. Thus, if I send a piece of gold to be assayed, and the report is returned to me as "Worse 4 carats 2¾ grs."—it means, that it is so much worse than standard; for example:—

	Car.	grs.	
	22	0	= standard.
Deduct worseness	4	2¾	

Ergo, 17 1¼ is the quality of my gold, and the value of it I ascertain from the tables, thus:—

Car.	grs.		£	s.	d.
17	1	is worth per oz.	3	1	0·733
0	0¼		0	0	2·655
17	1¼	=	£3	1	3·388

If, on the other hand, the report I receive from the assayer is "Better 1 carat 2¼ grains," I conclude that my gold is 23 carats 2¼ grains fine, and its value I ascertain as follows:—

Car.	grs.		£	s.	d.
23	2	is worth per oz.	4	3	2·215
0	0¼	" "			2·655
23	2¼		4	3	4·870

Whatever may be the vulgar opinion concerning gold, it is in the character of a "*Measure of Value and an Equivalent*" that its chief utility consists;—and it is only in proportion as these two great offices which it serves may be expanded and secured, that the vast addition which is now being made to the gold of the world will really be a blessing to mankind.

Should the quantity obtained from the mines reach such a limited point as may suffice for a gold coinage all over the globe (of a uniform, and therefore of a fixed value), an inestimable advantage will be secured; while, on the other hand, should the quantity be far in excess of what is required for this purpose, and the market be supplied with gold as it has heretofore been supplied with some of the inferior metals,—so that gold, of which our money is made, shall be perpetually varying in value even in reference to itself,—under such circumstances as these, it is difficult to say how far the commerce of the world may be deranged, or that which is now received as a boon will be esteemed a calamity.

Henrietta Street, Covent Garden,
February 1852.

TABLE

SHEWING THE RELATIVE QUANTITIES OF

FINE GOLD AND ALLOY IN ONE OUNCE OF METAL, of any Quality that can be found (whether in its Natural State, or Artificially Compounded), and the Sterling Value thereof.

FINE GOLD.			ALLOY.		1 oz. of Carat Gold.	STERLING VALUE.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
1	0	0	0	0	24	4	4	11.454
0	19	19	0	5	$23\frac{3}{4}$	4	4	0.835
0	19	14	0	10	$23\frac{2}{4}$	4	3	2.215
0	19	9	0	15	$23\frac{1}{4}$	4	2	3.596
0	19	4	0	20	23	4	1	4.977
0	18	23	1	1	$22\frac{3}{4}$	4	0	6.357
0	18	18	1	6	$22\frac{2}{4}$	3	19	7.738
0	18	13	1	11	$22\frac{1}{4}$	3	18	9.119
0	18	8	1	16	22	3	17	10.500
0	18	3	1	21	$21\frac{3}{4}$	3	16	11.880
0	17	22	2	2	$21\frac{2}{4}$	3	16	1.261
0	17	17	2	7	$21\frac{1}{4}$	3	15	2.642
0	17	12	2	12	21	3	14	4.022

Fine Gold.			Alloy.		1 oz. of Carat Gold.	Sterling Value.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
0	17	7	2	17	$20\frac{3}{4}$	3	13	5.403
0	17	2	2	22	$20\frac{2}{4}$	3	12	6.784
0	16	21	3	3	$20\frac{1}{4}$	3	11	8.164
0	16	16	3	8	20	3	10	9.545
0	16	11	3	13	$19\frac{3}{4}$	3	9	10.926
0	16	6	3	18	$19\frac{2}{4}$	3	9	0.306
0	16	1	3	23	$19\frac{1}{4}$	3	8	1.687
0	15	20	4	4	19	3	7	3.068
0	15	15	4	9	$18\frac{3}{4}$	3	6	4.448
0	15	10	4	14	$18\frac{2}{4}$	3	5	5.829
0	15	5	4	19	$18\frac{1}{4}$	3	4	7.210
0	15	0	5	0	18	3	3	8.591
0	14	19	5	5	$17\frac{3}{4}$	3	2	9.971
0	14	14	5	10	$17\frac{2}{4}$	3	1	11.352
0	14	9	5	15	$17\frac{1}{4}$	3	1	0.733
0	14	4	5	20	17	3	0	2.113
0	13	23	6	1	$16\frac{3}{4}$	2	19	3.494
0	13	18	6	6	$16\frac{2}{4}$	2	18	4.875
0	13	13	6	11	$16\frac{1}{4}$	2	17	6.255
0	13	8	6	16	16	2	16	7.636
0	13	3	6	21	$15\frac{3}{4}$	2	15	9.017
0	12	22	7	2	$15\frac{2}{4}$	2	14	10.397
0	12	17	7	7	$15\frac{1}{4}$	2	13	11.778
0	12	12	7	12	15	2	13	1.159
0	12	7	7	17	$14\frac{3}{4}$	2	12	2.539
0	12	2	7	22	$14\frac{2}{4}$	2	11	3.920
0	11	21	8	3	$14\frac{1}{4}$	2	10	5.301
0	11	16	8	8	14	2	9	6.682
0	11	11	8	13	$13\frac{3}{4}$	2	8	8.062
0	11	6	8	18	$13\frac{2}{4}$	2	7	9.443
0	11	1	8	23	$13\frac{1}{4}$	2	6	10.824

Fine Gold.			Alloy.		1 oz. of Carat Gold.	Sterling Value.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
0	10	20	9	4	13	2	6	0.204
0	10	15	9	9	12¾	2	5	1.585
0	10	10	9	14	12²⁄₄	2	4	2.966
0	10	5	9	19	12¼	2	3	4.346
0	10	0	10	0	12	2	2	5.727
0	9	19	10	5	11¾	2	1	7.108
0	9	14	10	10	11²⁄₄	2	0	8.488
0	9	9	10	15	11¼	1	19	9.869
0	9	4	10	20	11	1	18	11.250
0	8	23	11	1	10¾	1	18	0.630
0	8	18	11	6	10²⁄₄	1	17	2.011
0	8	13	11	11	10¼	1	16	3.392
0	8	8	11	16	10	1	15	4.773
0	8	3	11	21	9¾	1	14	6.153
0	7	22	12	2	9²⁄₄	1	13	7.534
0	7	17	12	7	9¼	1	12	8.915
0	7	12	12	12	9	1	11	10.295
0	7	7	12	17	8¾	1	10	11.676
0	7	2	12	22	8²⁄₄	1	10	1.057
0	6	21	13	3	8¼	1	9	2.437
0	6	16	13	8	8	1	8	3.818
0	6	11	13	13	7¾	1	7	5.199
0	6	6	13	18	7²⁄₄	1	6	6.579
0	6	1	13	23	7¼	1	5	7.960
0	5	20	14	4	7	1	4	9.341
0	5	15	14	9	6¾	1	3	10.721
0	5	10	14	14	6²⁄₄	1	3	0.102
0	5	5	14	19	6¼	1	2	1.483
0	5	0	15	0	6	1	1	2.864
0	4	19	15	5	5¾	1	0	4.244
0	4	14	15	10	5²⁄₄	0	19	5.625

Fine Gold.			Alloy.		1 oz. of Carat Gold.	Sterling Value.		
oz.	dwt.	grs.	dwt.	grs.		£	s.	d.
0	4	9	15	15	$5\frac{1}{4}$	0	18	7.006
0	4	4	15	20	5	0	17	8.386
0	3	23	16	1	$4\frac{3}{4}$	0	16	9.767
0	3	18	16	6	$4\frac{2}{4}$	0	15	11.148
0	3	13	16	11	$4\frac{1}{4}$	0	15	0.528
0	3	8	16	16	4	0	14	1.909
0	3	3	16	21	$3\frac{3}{4}$	0	13	3.290
0	2	22	17	2	$3\frac{2}{4}$	0	12	4.670
0	2	17	17	7	$3\frac{1}{4}$	0	11	6.051
0	2	12	17	12	3	0	10	7.432
0	2	7	17	17	$2\frac{3}{4}$	0	9	8.812
0	2	2	17	22	$2\frac{2}{4}$	0	8	10.193
0	1	21	18	3	$2\frac{1}{4}$	0	7	11.574
0	1	16	18	8	2	0	7	0.955
0	1	11	18	13	$1\frac{3}{4}$	0	6	2.335
0	1	6	18	18	$1\frac{2}{4}$	0	5	3.716
0	1	1	18	23	$1\frac{1}{4}$	0	4	5.097
0	0	20	19	4	1	0	3	6.477
0	0	15	19	9	$0\frac{3}{4}$	0	2	7.858
0	0	10	19	14	$0\frac{2}{4}$	0	1	9.239
0	0	5	19	19	$0\frac{1}{4}$	0	0	10.619
0	0	$3\frac{3}{4}$	19	$20\frac{1}{4}$	$\frac{3}{4}$ of carat grain.	0	0	7.965
0	0	$2\frac{1}{2}$	19	$21\frac{1}{2}$	$\frac{2}{4}$ ”	0	0	5.310
0	0	$1\frac{1}{4}$	19	$22\frac{3}{4}$	$\frac{1}{4}$ ”	0	0	2.655
0	0	$1\frac{3}{3}$	19	$23\frac{5}{8}$	$\frac{1}{8}$ ”	0	0	1.327

OF ASSAYING GENERALLY.

WHEN we speak of assaying the precious metals, it may be safely affirmed that we refer to a subject which in point of magnitude and general utility yields to no other that can be named: whether we contemplate it in its bearing upon the interests of individuals or of nations, we are brought to the same conclusion, viz., that it is a subject of vast, of universal importance.

Gold and silver being the most precious of metals, and forming, as they do, "the measure of value" all over the globe, it is obvious how great is the necessity that some unerring principles should be established, whereby to detect the frauds which mankind unhappily practise upon each other.

Such a check and protection, both to individuals and to nations, does the office of the assayer afford, by suggesting to the individual members of a community the impolicy of practising any deceit in the mixture of their metals, when such deceit can be easily detected; while on a more extended scale, and where the fatal effects of deceit and fraud would be co-extensive with the mercantile and social transactions of the world, it presents an effectual barrier against one nation imposing upon another in the all-important article of its bullion.

In the absence of any such check, it is obvious that all confidence would be at an end: nothing could be bought or sold, and universal suspicion would ensue. The respect which we now feel for the coin of the realm would be changed for distrust, while the confidence we are able to repose in the bullion of foreign countries would speedily wither and decay; and thus mankind would lose the immense advantage of a metallic currency.

The importance which the Legislature of our own highly-favoured country attaches to this subject, may be inferred from the safeguards by which it has thought fit to surround the manufacture of our gold and silver coinage. To the Government of the country is, of course, entrusted the duty of mixing the metals, and subsequently converting them into coin: the precise weights and fineness having been previously determined by acts of Parliament. The whole is done under the superintendence of the Master of the Mint, who is held responsible for its correct performance. But lest through mistake, or design on the part of the officers concerned, any error should creep in, by which the coin of the realm should be depreciated, the Legislature has wisely enacted, that at certain times a jury of twelve independent goldsmiths, well skilled in the art and mystery of assaying, shall be empannelled, under the superintendence of the Goldsmiths' Company, to sit in judgment upon the coin of the realm, and by weighing and assaying it themselves, act as a check upon the paid officers of the Crown. This jury is called the "*pix jury,*" from the duties it has to perform; and which are briefly these: When ever a batch of gold or silver coin is made at the Mint, the Legislature has enacted that a certain proportion shall be selected therefrom, and be carefully preserved as a sample of the weight and fineness of the whole.

These coins, so picked out (the number of which varies according to the number that has been coined, but always bearing an exact proportion to the same),* are carefully wrapped up in paper parcels, sealed with the seal of the Wardens, Masters, and Comptrollers of the Mint, and endorsed as being a given number of coins indifferently selected from a certain quantity that was coined on a certain day, and deposited in a box, called the "Pix Box,"† under the lock and key of the above-named sworn officers of the Crown.

---

* Of gold, one coin out of every journey (a weight of 15 lbs. troy = £700 17*s.* 6*d.* sterling). Of silver, one coin out of every journey (a weight of 60 lbs. troy = £198 sterling).

† *Pixus*, Latin for a little chest.

The duty, then, of the jury is to weigh and assay these coins, and it is plain that if they prove to be correct in weight and fineness, so must the mass have been from which they were taken; no matter whether the aggregate amount were one of hundreds, of thousands, or of millions.

The whole proceeding was formerly conducted with great solemnity: the opening of the box, unsealing of the parcels, and the examination of the coins, taking place in the presence of the Privy Council, presided over by the Lord Chancellor; who delivered a charge to the jury, pointing out to them the importance of the duty they are about to undertake, and calling upon them, as men well skilled in the art and mystery of assaying, and under the obligation of an oath, to exercise this their art to the best of their ability, for the benefit of the Queen's Majesty, and the weal of the nation. The examination of the coins is now made at Goldsmith's Hall; the jury having previously received their charge from the Lord Chancellor, in the presence of the Privy Council, at the Court of Exchequer.

Seeing, then, that to the goldsmiths of London has been assigned so honourable a position, it may be presumed they have made it their study—from a just sense of its importance, and their own individual responsibility — to maintain this ancient institution in all its integrity, by bringing to the inquiry the precise amount of knowledge requisite for its satisfactory elucidation. If, however, to his younger brethren of the craft, the writer may be permitted to address a few remarks, he would strongly advise them to study the subject, and to acquire such a knowledge* of its principles as shall enable them, if not to make an assay, at least, to exercise over him who makes it a degree of supervision in reality amounting to a check; and, in effect, rendering the verdict of the jury what it was intended it should be: namely, the result of the practical experience of the whole body; notwithstanding the assay be necessarily made by *one* only of the twelve, himself a professional assayer.

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* The Royal College of Chemistry supplies the means for attaining this knowledge.

The importance of this subject being fully established, both as respects the interests of individuals and of nations, it is intended in the following pages to explain the process of assaying: at least so much of it as applies to the precious metals in a manufactured state, or fit for manufacture.

The higher branches of mineral analysis, comprehending the method of extracting metals from their ores, with all the mechanical and chemical operations, included in an exact knowledge of the furnaces, fuel, crucibles, fluxes, and acids necessary for this purpose, come not within the scope of the Author's design. All these the reader will find elaborately set forth and explained in "Berthier's Traité des Essais par la Voie Sèche."

OF GOLD ASSAYING, AND THE WEIGHTS NECESSARY FOR THAT PURPOSE.

In this operation the weights are different from those used for a silver assay. Gold, when separated from alloy, is weighed in carats, grains, and quarters of a grain; four grains to the carat, and twenty-four carats to the pound troy. The assay weights are sixteen in number, all of them made with the nicest art to secure precision: 12 grains troy representing 24 carats, or one grain to every two carats; the thirty-second part of a grain representing one quarter of a grain of gold.

GOLD CARAT AND ASSAY WEIGHTS.

Gold.				Assay.
Car.	grs.	qrs.	(Troy)	Grs.
24	0	0	represented by a weight weighing . . .	12
22	0	0	„	11
18	0	0	„	9
12	0	0	„	6
6	0	0	„	3
3	0	0	„	1½
2	0	0	„	1
1	0	0	„	0½ a grain.
0	3	0	„	$\frac{3}{8}$ do.
0	2	0	„	$\frac{2}{8}$ do.
0	1	0	„	$\frac{1}{8}$ do.
0	0	3	„	$\frac{3}{32}$ do.
0	0	2	„	$\frac{2}{32}$ do.
0	0	1	„	$\frac{1}{32}$ do.

For Water (or pure) Silver, which is used in all gold assays, a weight representing 36, and another for 48 carats are required.

That of 36 cts. being represented by 18 grs.
„ 48 cts. „ „ 24 „

These two assay weights, together with the fourteen in the above table, complete sixteen, the number mentioned.

Presuming, then, that the weights and scales are before the assayer, the first thing he does is to place the weight representing 24 carats in one pan of the scales, and in the other pan the exact same weight of the gold under trial; and supposing, for the sake of illustration, that the operator suspected from the colour of the gold that its quality was of about 18 carats, he should add to it the finest silver, weighing 18 grains troy only, but in the assay weighed by the weight *representing* 36 carats. There would then be exactly double the quantity of silver to that of fine gold, for as 12 actual grains represented 24 carats, 18 grains will represent 36 carats. The gold and silver (weighing together 30 grains, but representing 60 carats) are then to be wrapped up in lead, shaped in the bullet mould as in the case of silver assaying, and placed in a cupel. This is put in the furnace for the space of about 25 minutes, but experience alone can determine *when* it should be taken out.

The result of this operation will be, that the fire will have caused the lead which wrapped up the gold and silver, together with whatever copper or other base metal there might have been in the gold, to descend into the cupel, leaving a small button of pure gold and silver, which must then be taken out of the cupel, and be hammered with a bright hammer on an anvil, and passed through a polished flatting-mill until it is about two or three inches in length, when it is called a "Cornet."

The next thing is to drop the metal into diluted nitric acid, and place it upon a sand bath heated by a fire underneath. This will have the effect of separating the silver from the gold, by dissolving or holding the former in solution, while the gold retains its solidity. This being effected, the assayer takes out the gold, and with a blow-pipe makes it red hot, a process termed annealing, which will turn it into a rich yellow colour: it is then in reality pure "fine gold." The next thing is to decide the precise quality it was of before the assay, and this he will easily ascertain by placing in one pan of the scales the weight representing 22 carats (or standard), and in the other pan the piece of now pure gold under trial; and supposing, for the sake of illustration, he finds that the gold is not so heavy as the 22 carat weight, by the weight representing 4 carats, it is obvious that the gold previous to the assay was of the quality of 18 carats, or, in other words, 4 carats worse than standard; or, on the other hand, should it be found heavier than the 22 carat weight, by the weight representing one carat, it follows that it was so much better than standard.

QUESTION ARISING OUT OF THE PRECEDING CHAPTER.

Q. Why is it necessary to unite fine silver with gold, in making a gold assay?

A. Because in the operation in the cupel it is only the baser metals which are extracted, leaving whatever quantity of fine gold, or fine silver there was in the mass each pure but still united. These the assayer separates by dissolving the silver in nitric acid, which will not dissolve the gold; and therefore when the gold is in excess, it protects the silver from the action of the nitric acid, which is obviated by adding sufficient silver to weaken the protective power of the gold: this requires some judgment; for if too much silver is added, the gold falls into a black powder, and is then difficult to collect. When the right quantity of silver is used, and is extracted, the gold assumes a porous appearance, with a rich brown colour.

OF PARTING ASSAYS.

In this operation the weights which are used for making a silver assay must be employed, as the inquiry about to be instituted is respecting the quantity of pure gold and silver there may be in 12 ounces (or a pound troy) of the metal under consideration.

Thus the assayer should place in one pan of his scales the weight representing a pound troy, and in the other the exact same weight of the metal about to be tested. This being done, he should wrap up the latter in lead, and commit it to the furnace, to remove the baser metals, as previously described, there to remain about 25 minutes, more or less, according to his judgment. He should then weigh it accurately, and, for the sake of illustration, we will suppose it now weighs only 11 ounces (*i. e.*, the weight representing 11 ounces); it is obvious there is one ounce deficient, and that is copper or baser metal, which the fire has extracted.

The next thing is to examine the button of *now* pure gold and silver remaining, with a view to ascertain what proportion of pure silver it will be necessary to add to it for the purpose of parting the two metals in the acid, and this requires great practice and judgment to determine. No precise rule can be laid down on this point, which shall be uniformly followed, as it all depends upon the quantity of silver there may appear to be in it already. It may, however, with safety be affirmed, that when the metal has been refined, if it have a very white appearance, it will be sufficient to add to it its own weight of silver *only*; whereas, if it be of a pale gold colour, then one and a half its own weight; and if of a higher colour, twice its own weight, and so on; the higher and richer the colour of the gold, the more silver it will require, up to three times its own weight, but never more than this. It is highly necessary, however, to proportion it with correctness as near as possible; as too much silver makes a broken assay, and if not enough, the acid will not act upon it, to effect a separation. When the proper complement of silver is added, it must be rolled up in sheet lead, committed to the furnace, and subsequently to the nitric acid, as previously described in the article on gold assaying.

The next part of the process is to weigh it accurately, and subtract the present weight from what it amounted to after first refining, which we have assumed to be 11 ounces; and supposing, for the sake of illustration, that it *now* exactly tallies with the weight representing 10 ounces, it is obvious there is 1 ounce deficient in this last operation, which is silver; *so* much silver having been extracted by the nitric acid over and above the quantity that may have been added to it. The result would then stand thus, viz.—

	Oz.
Weight of lump before the fire representing	12
„ after do.	11
Deficient	1 oz. being

copper or other base metal extracted.

	Oz.
Weight of lump before the acid representing	11
,, after do.	10

Deficient 1 oz. being silver extracted.

	Oz.
Or, fine gold	10
,, silver	1
,, copper, or base metal	1
	12 oz.,

or 1 lb. troy.

OF SILVER ASSAYING, AND THE WEIGHTS NECESSARY FOR THAT PURPOSE.

It may be necessary to premise, that to make an assay, implies a desire to know how much fine gold or silver there may be in any given quantity under consideration, no matter whether the metal be in a manufactured state or not; as in no case would it answer to operate on the mass. It is obvious, therefore, that the only way in which this question can be decided is by making the experiment upon a small scale; that is, by reducing the inquiry from one of hundreds or thousands of ounces, to one of grains and parts of a grain. Thus, for example, should any one desire to ascertain how much fine silver there is in an ingot of large dimensions, say of 250 ounces weight, the plan of proceeding will be, to determine, in the first place, whether the ingot is properly melted; and if so, then to take a piece off the bottom, weighing 12 grs. troy exactly, which to the mind of the assayer may represent 12 ounces, or one pound troy, and upon this piece, weighing 12 grs., to make the experiment; and it is plain that whatever amount of fine silver there is found to be in this small quantity, precisely the same amount must there be, in proportion, in any weight that can be named; that is, presuming the whole to be, as we have said before, properly melted.

Precisely the same plan will be pursued should the inquiry be regarding wrought plate, such as epergnes, dishes, forks, spoons,

&c.; only, in this case, scrapings must be taken from such parts as are perfectly free from solder, and care must be taken to scrape a portion from every part that has been connected by solder, and this can only be done by an experienced workman, who shall perfectly understand *how* the work has been brought together. Presuming this to be done, and the scrapings are considerable, more than one assay must be made, probably four or five, according to the quantity of scrapings; and it now remains to explain *how* the assay is made. First of all, then, the assayer must be furnished with a set of weights (12 in number), as described in the accompanying table, all of them being made with mathematical precision, and bearing the same comparative relation to each other, as follows:—

TABLE OF SILVER ASSAY WEIGHTS.

For the sake of convenience, the weights are so arranged that the one representing a pound troy shall not exceed 12 grains troy.

Oz.	dwt.	grs.		Grains.
12	0	0	represented by	12
11	0	0	"	11
6	0	0	"	6
3	0	0	"	3
2	0	0	"	2
1	0	0	"	1
0	10	0	"	½ a grain.
0	5	0	"	¼ of do.
0	3	0	"	$\frac{6}{10}$ of ¼ do.
0	2	0	"	$\frac{4}{10}$ of ¼ do.
0	1	0	"	$\frac{2}{10}$ of ¼ do.
0	0	12	"	$\frac{1}{10}$ of ¼ do.

And below this (viz., half a dwt. better or worse than standard) no notice is taken in silver assays. In making a set of weights, therefore, the first one required is a weight representing ½ dwt., weighing one-tenth part of a quarter of a grain troy, and this, too, with the utmost mathematical precision.

The weights, then, being before the assayer, the next thing required is a pair of finely-adjusted scales, which will turn with the weight of the hundredth part of a grain, enclosed in a glass-shade, to prevent the air or breath of the assayer from operating upon them. He should also have by him a piece of silver *known* to be standard; or, in other words, containing 11 oz. 2 dwts. of pure silver, and 18 dwts. of copper, in every twelve ounces, or pound troy. He then puts in one pan of his scales the weight representing the pound troy, and in the other an equal weight of the standard silver (called a check); after which, he takes out the weight, and supplies its place with the silver, the quality of which is about to be tested. The scales with the two quantities of metal exactly balancing, he takes the check piece and wraps it up in a piece of thinly flatted pure lead, and, having moulded it into shape, in a bullet mould, it is placed in a vessel called a cupel, made of burnt bone-ash, and in form resembling a cube about ⅞ths of an inch deep, and tapering towards the bottom, the top part having a hole sunk in it the exact size of the interior of the bullet mould.

The same thing precisely is done with the silver under trial; and then both cupels are put into the furnace, and kept there for the space of about 25 minutes. The result of this operation is that the lead in which the silver was wrapped up becomes absorbed by the bone-ash of which the cupel is made, together with whatever quantity of copper or other base metal there might have been in the silver; and the silver comes out of the fire quite pure. The next thing is to compare the metals one with the other; that is, to place the check piece in one pan of the scales, and the trial piece in the other; and supposing that the latter is found to be lighter than the former, it is obvious that it is worse than standard; whereas, if it be found heavier, it is better than standard; and it remains to be seen how much. This is easily ascertained by the application of the weights already mentioned: thus, if the trial piece be found to be heavier than the check, to the extent of the little weight representing one pennyweight, then it is one pennyweight better than standard; whereas, if it be so much lighter, it is one pennyweight worse than standard; or in any other proportion, as the case may be.

QUESTION ARISING OUT OF THE PRECEDING CHAPTER.

Q. Why is it necessary to unite lead with silver, in making a silver assay?

A. Because of the affinity which lead has to the copper, or any base metal that may be in the silver, and which it is the object of the assayer, aided by the fire, to remove. When in fusion, the lead has a property of combining with any baser metal than silver, and carrying it down with itself into the cupel, always taking, however, a small fraction of the silver with it. This is called the affinity of metals: hence it follows, that the coarser the silver under trial, the greater is the quantity of lead necessary to be added to it.

OF STANDARD GOLD.

It is obvious that there can be only one standard: the contrary implies a contradiction in terms. Two standards cannot go together without the danger of being exposed to continual conflict from the fluctuations of their relative values in the market, compared with that at which they are rated at the Mint; and, to prevent this evil, all the eminent writers on coin are agreed that only one metal can be the money or standard measure of property and commerce in any country.

In England, this standard is gold: it is the buyer of everything: it buys even silver; and, as an axiom in political economy, it should always be deemed that, while gold *is* the measure of value, it can never have a price: it is both a measure and an equivalent. It is, in fact, the "PRICE."

Standard gold, as by law established, is a composition in which there are 22 parts of fine gold, and 2 parts of alloy in every 24 parts; and its price of 77*s.* 10½*d.* per oz. was fixed in the reign of Charles II., when it was ordained that 44½ guineas should be cut out of a pound troy: 77*s.* 10½*d.* being the 1/12th part of £46. 14*s.* 6*d.* This standard was formerly the only one allowed for wrought plate, and it was consequently unlawful for a goldsmith to make any vessel or ware of less fineness; but in the reign of George III. it was found to be expedient to permit goldsmiths to employ gold in their manufactures less in fineness than 22 carats, and an Act of Parliament was passed to allow, for this purpose, a lower quality, viz., one of 18 carats, or of a composition containing 18 parts of fine gold, and 6 parts of alloy.

The object of the Legislature in both cases was evidently the same, viz., to afford a protection to the public against being imposed upon in a matter in which deceit and fraud were so difficult to detect; and in which the consequences of fraud would be so serious, owing to the great value of the metal (that of 22 cts. being 77*s.* 10½*d.*, and that of 18 cts. 63*s.* 8½*d.* per oz.). And, on this account, the Legislature enacted, in the first place, that gold less in fineness than a defined quality should not be wrought into plate or jewellery; and in order to enforce this regulation, it conferred upon the Goldsmiths' Company power to survey, search, and make trial of whatever gold they found in the course of manufacture in the shops of the workmen, and if such gold were found to be worse than standard, to break up the same, levying fines upon the parties so offending. The Company, too, had authority delegated to them to administer to their freemen an oath, whereby they promised "that they would not work, or cause to be wrought, in their manufactures, gold or silver less in fineness than the standard appointed for wrought plate."

In order to afford the public a still greater guarantee that the quality of the gold they purchased was what it appeared to be, the Legislature empowered the Goldsmiths' Company to call upon the manufacturers to bring all the articles they made to their Hall, for the purpose of being assayed, and stamped with their Hall mark.

In process of time, however, it became

necessary to make exceptions to this latter rule. It was found that requiring everything to be Hall-marked cramped the talent of invention, and prevented the goldsmith making many articles which his taste led him to introduce, and which his foreign rivals were producing. Hence, it became necessary to exempt from Hall-marking such articles as, by reason of their smallness, form, or rich chasing, could not be assayed, or if assayed, could not receive the Company's marks.

These exemptions once made opened a door which could not be shut. Exemption from Hall-marking sanctioned by law, soon led to reduction in quality contrary to law. What the Goldsmiths' Company had not the power to *mark*, it could not be expected it should be responsible for; and hence arose a practice, which, up to the present time, has remained unchecked, of every kind and quality of gold being used in the manufacture of jewellery, *without such quality being specially denoted:* a practice which cannot now be stopped, and the evil consequences of which in many respects cannot be estimated.

Hence it is obvious that as respects nine-tenths of the jewellery which is manufactured in this country, no guarantee exists whereby the public may be assured of the quality of the gold of which it is made: all that they can depend upon is the character of the goldsmith. If he be a man of integrity, he will of course be trusted; but if not, the opportunities of practising deceit and fraud which are placed within his reach are great beyond conception.

OF STERLING SILVER; AS IT IS NOW, LEGAL TENDER FOR FIVE POUNDS; AND AS IT IS LAWFUL FOR WROUGHT PLATE.

GOLD being the principal measure of value and instrument of commerce; silver, as it circulates in coin, takes its value from, and becomes subservient to it.

Standard silver, therefore, is a thing which has no existence in Britain, seeing that it is bought and sold with gold, and is liable to fluctuations in value, like all other commodities.

A scarcity of gold, or a redundance of silver, will have the same effect on their relative values. Silver, here, will be lower in price, while on the Continent, where silver is the standard or measure of value, the premium on gold will advance.

The United States, after their independence, took silver (the Spanish dollar) for their standard of value; but coined gold pieces of 5 and 10 dollars, of the relative value of about 15 to 1: which relative value afterwards increasing to about 15½ to 1, the gold, as a consequence, disappeared. They have now reduced their gold coins from 916 fine to 900 fine, and 11 dwt. 6 grs. in weight to 10 dwt. 18 grs.; but this is no tampering with the coinage, or robbery on the public—silver, in America, being the "PRICE." The same effect occurs in France, but is adjusted by the agio on gold.

At a former period, when silver was the British measure of value, it was ordained that it should contain 11 oz. 2 dwt. of fine silver, and 18 dwt. of copper in every pound troy; and of the same quality is the silver coin now made: circulating, as it does, as a legal tender for five pounds *only*.

Of this quality the Legislature has also ordained that all silver plate shall be made; and, in order to enforce the practice, has invested the Ancient and Worshipful Company of Goldsmiths of London, with full powers of making search in silversmiths' shops, and ordering the silversmiths to bring their work to the Goldsmiths' Hall, for the purpose of having it assayed (the like powers being conferred on several other corporations in different parts of the kingdom); and if found correct, to have the Company's Hall mark stamped thereon, indicative of such correctness: as also of the manufacturer having paid the sum of 1*s*. 6*d*. per oz. for duty, which the Goldsmiths' Companies collect for the Government, levying a small charge to reimburse themselves for marking, and the expense of making the assay.

If it be asked what is the value of silver, in wrought plate, the answer is that it varies from 5*s.* to 5*s.* 2*d.* per oz.; but as it depends upon the market price of fine silver, *that* being known, the former may always be ascertained by the following method:—

Fine silver,	11 oz.	2 dwt.
Copper,	0	18 „
Make	12 oz. of sterling silver.	

This is the quality required by law for all silver plate of British manufacture.

Supposing, then, that fine silver is worth 5*s.* 6*d.* per oz., calculate the value of 11 oz. 2 dwt. of such silver, and divide the product by 12, and you have the value of one ounce of sterling silver. Thus, one ounce of fine silver being worth—

s.	*d.*		Oz.	dwt.	
5	6				
	11 oz. 2 dwt.				
60	6				
	6½				
61	0½	is the value of	11	2	of fine silver,
		and the copper not being reckoned	0	18	
61	0½	is the value of	12	0	of sterling silver, or 5*s.* 1*d.* per oz.

OF ALLOYS.

It is not generally known that gold and silver, in their fine and pure state, are both metals so soft that they cannot be wrought into useful articles. The difficulty, however, is removed by mixing with them a small portion of alloy; which in silver should consist of copper only, and in gold of a portion of silver and copper. Hence the necessity that a correct scale of alloys should be established, which shall enable the goldsmith to mix his metals in such a manner as may, by reason of the hardness or softness, and variety of colour attainable thereby, be best adapted for the articles into which they are intended to be wrought; and at the same time furnish the goldsmith with the means of readily ascertaining the precise value of the metal when alloyed.

Thus, for example, should the goldsmith desire to prepare his gold for the purposes of dental surgery, experience will have shewn him the necessity of a certain degree of softness being preserved in the metal which is to form the palate, while for the springs, a great degree of hardness is requisite; and for the one, he will mix his metal of the quality of 22 carats, and for the other, not finer than 16 carats, according to the preceding table; which exhibits not only the proportions of fine gold and alloy in every quality, but also the sterling value per ounce.

In like manner, should he desire gold to be manufactured into pens, he will seek to obtain the degree of elasticity which is indispensable for the production of a good pen; and this can only be procured by a larger proportion of silver in the alloy.

In a word, hardness, softness, beauty of colour, and adaptation for the reception of enamels, are the four points sought to be obtained by an expert goldsmith in preparing his gold; and in no other way than by a judicious mixture of alloy can they be produced.

Another, and perhaps the most important reason why the precious metal, gold, need be alloyed before it be manufactured into plate or jewellery, is the very high value of the metal itself, viz., 84*s.* 11½*d.* per oz.; for it is obvious, that were it even possible to convert it into useful articles in its fine or pure state, a great part of the public could not afford to purchase it. Consequently, a correct scale of alloy is indispensable for enabling the goldsmith to make his metal of any particular value his customers may desire; at least, for such articles as are not required by law to be made of 18 carat gold, and Hall-marked.

The mischief, however, attending the present system is this: many jewellers, with a want of candour much to be condemned, instead of acquainting the public with the foregoing facts respecting the absolute necessity of adding a portion of alloy to the precious metals, in order to render them useful, induce a belief that the contrary is the case, by affixing to most of the articles they sell the title of FINE GOLD! and thus, it is to be feared, they often succeed in obtaining an unfair equivalent for a metal of very low value, instead of the one they pretend it to be—*fine gold.*

This practice cannot be too strongly condemned; inflicting, as it does, a most serious injury both on the public, and the fair trading goldsmith. Upon the former a gross imposition is practised; while the latter is made to suffer a serious grievance, by having his good gold (frequently of 16 carats value) contrasted with inferior gold, often of the quality of no better than 10 or 11 carats: and that, too, by the very persons who do not hesitate to dignify with the title of "Fine Gold," spurious articles of jewellery, which they know to be composed of metal of much inferior value.

A new system of imposition which has been lately attempted, and it is feared not without considerable success, deserves to be noticed both by the trade and the public.

It has recently been found that gold of the quality of 11 carats, or less, if alloyed with zinc, instead of the proper quantity of silver, presents a colour very nearly equal to that of a metal at least 2½ or 3 carats higher; or of 8*s.* or 10*s.* an ounce more value. The consequence has been that a large quantity of jewellery has been made of gold alloyed in this manner, and the same has been purchased by some shopkeepers; very much to their own loss, as well as to that of the public; inasmuch as a galvanic action is produced, after a time, upon gold so alloyed, the effect of which is to split the metal into separate pieces, and render the article perfectly useless. Gold chains, pencil-cases, thimbles, and lockets, are the articles of which the public and the shopkeepers will do well to take heed; as these have, among other things, been lately so manufactured.

THE END.

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